



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RADIATION AND INDOOR AIR  
National Air and Radiation Environmental Laboratory  
540 South Morris Avenue, Montgomery, AL 36115-2601  
(334) 270-3400

May 26, 2009

**MEMORANDUM**

40314548



Superfund

**SUBJECT:** Radiochemical Results for  
Kansas Radium Dial Site Samples

**FROM:** John Griggs, Chief *John Griggs*  
Monitoring and Analytical Services Branch

**TO:** Randy Schademann, OSC  
Region 7

Attached are data packages for gamma analysis of samples collected from the Kansas Radium Dial site in Wichita, KS. The samples constitute NAREL batch numbers 0900021 and 0900022. The results of further analyses will be sent as they are completed.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Robert Dye, Region 7, w/o attachments  
Ron Fraass, NAREL

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY  
GAMMA ANALYSES**

**REPORT OF SAMPLE DELIVERY GROUP #0900021**

Project: Region 7 - Kansas Radium Dial Site, Wichita, KS  
 Analysis Procedure: Gamma Spectrometry  
 Report ID: 0900021-GAMMA  
 Report Type: Original  
 Date Reported: 05/14/2009  
 Total Pages in Report:

**SAMPLES**

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A9.02906E	650-SB-BG1 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02907F	650-SB-BG2 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02908G	650-SB-7-2 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02909H	650-SB-10-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02910A	650-SB-10-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02911B	650-SB-13-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02912C	650-SB-13-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02913D	650-SB-13-2 (0-3.5 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02914E	650-SB-13-2 (3.5-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02915F	650-SB-13-3 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02916G	650-SB-13-3 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02917H	650-SB-13-3 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02918J	650-SB-17-1 (0-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02919K	650-SB-17-1 (3-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02920C	650-SS-9-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02921D	650-SS-12-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02922E	650-SS-23-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02923F	650-SS-24-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02924G	650-SS-BGA	SAM	SOIL	03/26/2009	04/02/2009
A9.02925H	650-SS-BGB	SAM	SOIL	03/26/2009	04/02/2009

**EXCEPTIONS**

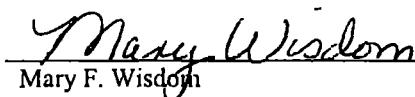
1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

## QUALITY CONTROL

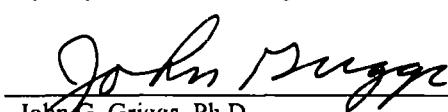
1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

## CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

  
\_\_\_\_\_  
Mary F. Wisdom  
Quality Assurance Manager, NAREL

5-19-09  
Date

  
\_\_\_\_\_  
John G. Griggs, Ph.D.  
Director, Center for Environmental Radioanalytical  
Laboratory Science

5/26/09  
Date

## GENERAL INFORMATION

### SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

### ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

### QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

### EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

## GENERAL INFORMATION (CONTINUED)

### GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**ANALYSIS SUMMARY**

Analysis Procedure: NAREL GAM-01  
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A9.02906E		N/A	05/05/2009	0013224J	0005750W
A9.02906E	DUP	N/A	05/06/2009	0013224J	0005750W
A9.02907F		N/A	05/05/2009	0013224J	0005750W
A9.02908G		N/A	05/05/2009	0013224J	0005750W
A9.02909H		N/A	05/04/2009	0013224J	0005750W
A9.02910A		N/A	05/05/2009	0013224J	0005750W
A9.02911B		N/A	05/05/2009	0013224J	0005750W
A9.02912C		N/A	05/07/2009	0013224J	0005750W
A9.02913D		N/A	05/13/2009	0013224J	0005750W
A9.02914E		N/A	05/13/2009	0013224J	0005750W
A9.02915F		N/A	05/13/2009	0013224J	0005750W
A9.02916G		N/A	05/13/2009	0013224J	0005750W
A9.02917H		N/A	05/05/2009	0013224J	0005750W
A9.02918J		N/A	05/13/2009	0013224J	0005750W
A9.02919K		N/A	05/05/2009	0013224J	0005750W
A9.02920C		N/A	05/05/2009	0013224J	0005750W
A9.02921D		N/A	05/06/2009	0013224J	0005750W
A9.02922E		N/A	05/14/2009	0013224J	0005750W
A9.02923F		N/A	05/13/2009	0013224J	0005750W
A9.02924G		N/A	05/05/2009	0013224J	0005750W
A9.02925H		N/A	05/14/2009	0013224J	0005750W
LCS-00559857U *	LCS	N/A	05/14/2009	0013224J	0005750W
RBK-00559856T *	RBK	N/A	05/14/2009	0013224J	0005750W

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**PREPARATION METHOD(S) USED**

Procedure ID	Title

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02906E	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.190e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	82.52 %	Analyst:	RCL
Ash/dry weight:	95.20 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE01	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		7.9e-01	PCI/GDRY	03/26/2009
Bi212	1.40e+00	2.4e-01		PCI/GDRY	03/26/2009
Bi214 *	1.24e+00	1.5e-01		PCI/GDRY	03/26/2009
Co60	ND		3.5e-02	PCI/GDRY	03/26/2009
Cs137	ND		3.1e-02	PCI/GDRY	03/26/2009
I131	ND		6.6e-01	PCI/GDRY	03/26/2009
K40	2.07e+01	2.4e+00		PCI/GDRY	03/26/2009
Pb212	1.49e+00	1.8e-01		PCI/GDRY	03/26/2009
Pb214 *	1.34e+00	1.6e-01		PCI/GDRY	03/26/2009
Ra223 *	4.13e-01	8.3e-02		PCI/GDRY	03/26/2009
Ra224	1.22e+00	3.6e-01		PCI/GDRY	03/26/2009
Ra226 *	2.29e+00	4.0e-01		PCI/GDRY	03/26/2009
Ra228	1.45e+00	1.8e-01		PCI/GDRY	03/26/2009
Tl208	4.98e-01	6.1e-02		PCI/GDRY	03/26/2009
U235 *	1.44e-01	2.5e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02906E	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.190e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	82.52 %	Analyst:	RCL
Ash/dry weight:	95.20 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/05/2009 16:23	1000.0	GE06	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		6.3e-01	PCI/GDRY	03/26/2009
Bi212	1.48e+00	2.2e-01		PCI/GDRY	03/26/2009
Bi214 *	1.26e+00	1.5e-01		PCI/GDRY	03/26/2009
Co60	ND		2.8e-02	PCI/GDRY	03/26/2009
Cs137	ND		2.4e-02	PCI/GDRY	03/26/2009
I131	ND		6.3e-01	PCI/GDRY	03/26/2009
K40	2.19e+01	2.5e+00		PCI/GDRY	03/26/2009
Pb212	1.44e+00	1.7e-01		PCI/GDRY	03/26/2009
Pb214 *	1.37e+00	1.6e-01		PCI/GDRY	03/26/2009
Ra223 *	3.39e-01	6.8e-02		PCI/GDRY	03/26/2009
Ra224	9.00e-01	3.0e-01		PCI/GDRY	03/26/2009
Ra226 *	2.26e+00	3.7e-01		PCI/GDRY	03/26/2009
Ra228	1.51e+00	1.8e-01		PCI/GDRY	03/26/2009
Th234 *	8.76e-01	2.3e-01		PCI/GDRY	03/26/2009
Tl208	4.81e-01	5.9e-02		PCI/GDRY	03/26/2009
U235 *	1.39e-01	2.3e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02907F	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.830e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	84.22 %	Analyst:	RCL
Ash/dry weight:	95.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE06	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		5.3e-01	PCI/GDRY	03/26/2009
Bi212	1.30e+00	2.1e-01		PCI/GDRY	03/26/2009
Bi214 *	1.13e+00	1.3e-01		PCI/GDRY	03/26/2009
Co60	ND		2.5e-02	PCI/GDRY	03/26/2009
Cs137	ND		2.1e-02	PCI/GDRY	03/26/2009
I131	ND		4.9e-01	PCI/GDRY	03/26/2009
K40	2.00e+01	2.3e+00		PCI/GDRY	03/26/2009
Pb212	1.31e+00	1.5e-01		PCI/GDRY	03/26/2009
Pb214 *	1.19e+00	1.4e-01		PCI/GDRY	03/26/2009
Ra223 *	3.16e-01	6.3e-02		PCI/GDRY	03/26/2009
Ra224	9.33e-01	2.8e-01		PCI/GDRY	03/26/2009
Ra226 *	1.99e+00	3.3e-01		PCI/GDRY	03/26/2009
Ra228	1.33e+00	1.6e-01		PCI/GDRY	03/26/2009
Th234 *	8.80e-01	2.4e-01		PCI/GDRY	03/26/2009
Tl208	4.30e-01	5.2e-02		PCI/GDRY	03/26/2009
U235 *	1.24e-01	2.0e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02908G	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.880e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	93.71 %	Analyst:	RCL
Ash/dry weight:	92.40 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:06	500.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.2e+00	PCI/GDRY	03/26/2009
Bi212	6.01e-01	2.8e-01		PCI/GDRY	03/26/2009
Bi214 *	9.14e+00	1.1e+00		PCI/GDRY	03/26/2009
Co60	ND		4.4e-02	PCI/GDRY	03/26/2009
Cs137	9.73e-02	2.6e-02		PCI/GDRY	03/26/2009
I131	ND		1.1e+00	PCI/GDRY	03/26/2009
K40	1.23e+01	1.5e+00		PCI/GDRY	03/26/2009
Pb212	5.49e-01	8.4e-02		PCI/GDRY	03/26/2009
Pb214 *	9.82e+00	1.1e+00		PCI/GDRY	03/26/2009
Ra223 *	1.76e-01	1.5e-01		PCI/GDRY	03/26/2009
Ra224	8.16e-01	6.6e-01		PCI/GDRY	03/26/2009
Ra226 *	1.33e+01	1.6e+00		PCI/GDRY	03/26/2009
Ra228	5.35e-01	8.9e-02		PCI/GDRY	03/26/2009
Tl208	1.76e-01	3.2e-02		PCI/GDRY	03/26/2009
U235 *	8.35e-01	1.0e-01		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02909H	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.900e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	91.62 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 12:09	300.0	GE14	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		7.9e-01	PCI/GDRY	03/26/2009
Bi212	8.18e-01	1.8e-01		PCI/GDRY	03/26/2009
Bi214 *	4.90e+00	5.7e-01		PCI/GDRY	03/26/2009
Co60	ND		2.8e-02	PCI/GDRY	03/26/2009
Cs137	1.37e-02	9.8e-03		PCI/GDRY	03/26/2009
I131	ND		7.9e-01	PCI/GDRY	03/26/2009
K40	2.10e+01	2.4e+00		PCI/GDRY	03/26/2009
Pb212	7.12e-01	8.9e-02		PCI/GDRY	03/26/2009
Pb214 *	5.28e+00	6.1e-01		PCI/GDRY	03/26/2009
Ra223 *	9.41e-02	9.1e-02		PCI/GDRY	03/26/2009
Ra224	4.40e-01	3.9e-01		PCI/GDRY	03/26/2009
Ra226 *	6.89e+00	8.9e-01		PCI/GDRY	03/26/2009
Ra228	7.46e-01	9.7e-02		PCI/GDRY	03/26/2009
Tl208	2.29e-01	3.1e-02		PCI/GDRY	03/26/2009
U235 *	4.32e-01	5.6e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02910A	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.020e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	87.59 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE07	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		5.6e-01	PCI/GDRY	03/26/2009
Bi212	1.07e+00	2.0e-01		PCI/GDRY	03/26/2009
Bi214 *	1.12e+00	1.3e-01		PCI/GDRY	03/26/2009
Co60	ND		2.5e-02	PCI/GDRY	03/26/2009
Cs137	2.23e-02	1.0e-02		PCI/GDRY	03/26/2009
I131	ND		5.4e-01	PCI/GDRY	03/26/2009
K40	1.85e+01	2.2e+00		PCI/GDRY	03/26/2009
Pb212	1.05e+00	1.2e-01		PCI/GDRY	03/26/2009
Pb214 *	1.17e+00	1.4e-01		PCI/GDRY	03/26/2009
Ra223 *	2.38e-01	5.7e-02		PCI/GDRY	03/26/2009
Ra224	5.32e-01	2.8e-01		PCI/GDRY	03/26/2009
Ra226	ND		3.8e-01	PCI/GDRY	03/26/2009
Ra228	1.07e+00	1.3e-01		PCI/GDRY	03/26/2009
Th234 *	1.21e+00	2.4e-01		PCI/GDRY	03/26/2009
Tl208	3.49e-01	4.3e-02		PCI/GDRY	03/26/2009
U235 *	1.12e-01	2.0e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02911B	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.860e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	89.17 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE09	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+00	PCI/GDRY	03/26/2009
Bi212	6.56e-01	2.5e-01		PCI/GDRY	03/26/2009
Bi214 *	1.43e+01	1.6e+00		PCI/GDRY	03/26/2009
Co60	ND		5.0e-02	PCI/GDRY	03/26/2009
Cs137	5.29e-02	2.4e-02		PCI/GDRY	03/26/2009
I131	ND		1.3e+00	PCI/GDRY	03/26/2009
K40	1.16e+01	1.4e+00		PCI/GDRY	03/26/2009
Pb212	6.73e-01	9.0e-02		PCI/GDRY	03/26/2009
Pb214 *	1.53e+01	1.8e+00		PCI/GDRY	03/26/2009
Ra223 *	3.95e-01	1.7e-01		PCI/GDRY	03/26/2009
Ra224	1.59e+00	5.9e-01		PCI/GDRY	03/26/2009
Ra226 *	2.04e+01	2.4e+00		PCI/GDRY	03/26/2009
Ra228	6.37e-01	9.9e-02		PCI/GDRY	03/26/2009
Th234 *	1.30e+00	3.5e-01		PCI/GDRY	03/26/2009
Tl208	2.26e-01	3.5e-02		PCI/GDRY	03/26/2009
U235 *	1.24e+00	1.5e-01		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02912C	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.230e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	84.37 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/06/2009 15:48	1000.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.2e+00	PCI/GDRY	03/26/2009
Bi212	1.11e+00	2.7e-01		PCI/GDRY	03/26/2009
Bi214 *	4.87e+00	5.7e-01		PCI/GDRY	03/26/2009
Co60	ND		5.4e-02	PCI/GDRY	03/26/2009
Cs137	ND		3.9e-02	PCI/GDRY	03/26/2009
I131	ND		1.1e+00	PCI/GDRY	03/26/2009
K40	7.85e+00	9.9e-01		PCI/GDRY	03/26/2009
Pb210 *	4.17e+00	6.3e-01		PCI/GDRY	03/26/2009
Pb212	9.04e-01	1.1e-01		PCI/GDRY	03/26/2009
Pb214 *	5.13e+00	5.9e-01		PCI/GDRY	03/26/2009
Ra223 *	4.90e-01	1.1e-01		PCI/GDRY	03/26/2009
Ra224	1.01e+00	4.8e-01		PCI/GDRY	03/26/2009
Ra226 *	5.14e+00	7.4e-01		PCI/GDRY	03/26/2009
Ra228	8.78e-01	1.3e-01		PCI/GDRY	03/26/2009
Th227	2.36e-01	9.9e-02		PCI/GDRY	03/26/2009
Th234 *	3.78e+00	4.9e-01		PCI/GDRY	03/26/2009
Tl208	3.06e-01	4.4e-02		PCI/GDRY	03/26/2009
U235 *	2.45e-01	3.9e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02913D	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.180e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	84.24 %	Analyst:	RCL
Ash/dry weight:	94.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 13:20	100.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e+01	PCI/GDRY	03/26/2009
Bi214 *	2.41e+02	2.8e+01		PCI/GDRY	03/26/2009
Co60	ND		8.3e-01	PCI/GDRY	03/26/2009
Cs137	ND		7.6e-01	PCI/GDRY	03/26/2009
I131	ND		3.3e+01	PCI/GDRY	03/26/2009
K40	1.58e+01	4.1e+00		PCI/GDRY	03/26/2009
Pb210 *	1.60e+02	1.9e+01		PCI/GDRY	03/26/2009
Pb212	8.05e-01	4.6e-01		PCI/GDRY	03/26/2009
Pb214 *	2.47e+02	2.8e+01		PCI/GDRY	03/26/2009
Ra224	1.61e+01	8.1e+00		PCI/GDRY	03/26/2009
Ra226 *	3.02e+02	3.6e+01		PCI/GDRY	03/26/2009
Ra228	ND		5.4e+00	PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02914E	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.690e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	76.22 %	Analyst:	RCL
Ash/dry weight:	94.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 14:59	100.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		3.6e+00	PCI/GDRY	03/26/2009
Bi212	1.63e+00	5.8e-01		PCI/GDRY	03/26/2009
Bi214 *	1.04e+00	1.6e-01		PCI/GDRY	03/26/2009
Co60	ND		6.1e-02	PCI/GDRY	03/26/2009
Cs137	ND		9.5e-02	PCI/GDRY	03/26/2009
I131	ND		4.3e+00	PCI/GDRY	03/26/2009
K40	1.89e+01	2.5e+00		PCI/GDRY	03/26/2009
Pb212	1.52e+00	2.1e-01		PCI/GDRY	03/26/2009
Pb214 *	1.29e+00	1.8e-01		PCI/GDRY	03/26/2009
Ra226 *	1.70e+00	9.5e-01		PCI/GDRY	03/26/2009
Ra228	1.51e+00	2.3e-01		PCI/GDRY	03/26/2009
Tl208	4.89e-01	8.0e-02		PCI/GDRY	03/26/2009
U235 *	1.07e-01	6.0e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02915F	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.670e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	86.33 %	Analyst:	RCL
Ash/dry weight:	92.40 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:41	100.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+01	PCI/GDRY	03/26/2009
Bi214 *	1.33e+02	1.5e+01		PCI/GDRY	03/26/2009
Co60	ND		4.0e-01	PCI/GDRY	03/26/2009
Cs137	ND		4.1e-01	PCI/GDRY	03/26/2009
I131	ND		1.9e+01	PCI/GDRY	03/26/2009
K40	1.16e+01	2.3e+00		PCI/GDRY	03/26/2009
Pb212	9.46e-01	4.3e-01		PCI/GDRY	03/26/2009
Pb214 *	1.42e+02	1.6e+01		PCI/GDRY	03/26/2009
Ra224	9.66e+00	4.9e+00		PCI/GDRY	03/26/2009
Ra226 *	1.87e+02	2.2e+01		PCI/GDRY	03/26/2009
Ra228	ND		2.7e+00	PCI/GDRY	03/26/2009
Tl208	2.24e-01	1.4e-01		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02916G	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.710e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	82.50 %	Analyst:	RCL
Ash/dry weight:	90.40 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 18:23	100.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		5.3e+00	PCI/GDRY	03/26/2009
Bi212	1.45e+00	8.1e-01		PCI/GDRY	03/26/2009
Bi214 *	9.99e+00	1.2e+00		PCI/GDRY	03/26/2009
Co60	ND		1.3e-01	PCI/GDRY	03/26/2009
Cs137	4.90e-02	5.3e-02		PCI/GDRY	03/26/2009
I131	ND		6.4e+00	PCI/GDRY	03/26/2009
K40	1.66e+01	2.2e+00		PCI/GDRY	03/26/2009
Pb212	1.04e+00	1.7e-01		PCI/GDRY	03/26/2009
Pb214 *	1.05e+01	1.2e+00		PCI/GDRY	03/26/2009
Ra223 *	6.04e-01	5.2e-01		PCI/GDRY	03/26/2009
Ra224	1.21e+00	1.5e+00		PCI/GDRY	03/26/2009
Ra226 *	1.57e+01	2.3e+00		PCI/GDRY	03/26/2009
Ra228	1.09e+00	2.2e-01		PCI/GDRY	03/26/2009
Tl208	3.18e-01	7.3e-02		PCI/GDRY	03/26/2009
U235 *	9.83e-01	1.4e-01		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02917H	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.540e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	80.07 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE15	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		5.9e-01	PCI/GDRY	03/26/2009
Bi212	1.65e+00	2.4e-01		PCI/GDRY	03/26/2009
Bi214 *	1.23e+00	1.4e-01		PCI/GDRY	03/26/2009
Co60	ND		2.4e-02	PCI/GDRY	03/26/2009
Cs137	ND		2.3e-02	PCI/GDRY	03/26/2009
I131	ND		5.6e-01	PCI/GDRY	03/26/2009
K40	2.20e+01	2.5e+00		PCI/GDRY	03/26/2009
Pb210 *	7.73e-01	2.2e-01		PCI/GDRY	03/26/2009
Pb212	1.17e+00	1.4e-01		PCI/GDRY	03/26/2009
Pb214 *	1.25e+00	1.5e-01		PCI/GDRY	03/26/2009
Ra226 *	2.31e+00	3.6e-01		PCI/GDRY	03/26/2009
Ra228	1.47e+00	1.7e-01		PCI/GDRY	03/26/2009
Th234 *	6.63e-01	1.4e-01		PCI/GDRY	03/26/2009
Tl208	4.84e-01	5.7e-02		PCI/GDRY	03/26/2009
U235 *	1.42e-01	2.2e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02918J	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.700e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	84.34 %	Analyst:	RCL
Ash/dry weight:	94.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 20:05	100.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.8e+01	PCI/GDRY	03/26/2009
Bi214 *	1.67e+02	1.9e+01		PCI/GDRY	03/26/2009
Co60	ND		4.0e-01	PCI/GDRY	03/26/2009
Cs137	ND		4.5e-01	PCI/GDRY	03/26/2009
I131	ND		2.2e+01	PCI/GDRY	03/26/2009
K40	1.88e+01	2.9e+00		PCI/GDRY	03/26/2009
Pb212	9.45e-01	3.7e-01		PCI/GDRY	03/26/2009
Pb214 *	1.80e+02	2.1e+01		PCI/GDRY	03/26/2009
Ra224	7.50e+00	5.6e+00		PCI/GDRY	03/26/2009
Ra226 *	3.02e+02	3.5e+01		PCI/GDRY	03/26/2009
Ra228	ND		3.0e+00	PCI/GDRY	03/26/2009
Tl208	1.73e-01	1.4e-01		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02919K	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.110e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	80.95 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE16	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		4.5e-01	PCI/GDRY	03/26/2009
Bi212	1.51e+00	2.1e-01		PCI/GDRY	03/26/2009
Bi214 *	1.54e+00	1.8e-01		PCI/GDRY	03/26/2009
Co60	ND		2.1e-02	PCI/GDRY	03/26/2009
Cs137	ND		1.8e-02	PCI/GDRY	03/26/2009
I131	ND		4.3e-01	PCI/GDRY	03/26/2009
K40	2.30e+01	2.7e+00		PCI/GDRY	03/26/2009
Pb210 *	1.60e+00	2.5e-01		PCI/GDRY	03/26/2009
Pb212	1.03e+00	1.2e-01		PCI/GDRY	03/26/2009
Pb214 *	1.64e+00	1.9e-01		PCI/GDRY	03/26/2009
Ra226 *	2.75e+00	3.8e-01		PCI/GDRY	03/26/2009
Ra228	1.45e+00	1.7e-01		PCI/GDRY	03/26/2009
Th234 *	7.12e-01	1.2e-01		PCI/GDRY	03/26/2009
Tl208	4.72e-01	5.6e-02		PCI/GDRY	03/26/2009
U235 *	1.72e-01	2.4e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02920C	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.850e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	89.49 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/05/2009 00:28	500.0	GE13	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.1e+00	PCI/GDRY	03/26/2009
Bi212	1.13e+00	3.0e-01		PCI/GDRY	03/26/2009
Bi214 *	6.90e+00	8.0e-01		PCI/GDRY	03/26/2009
Co60	ND		4.0e-02	PCI/GDRY	03/26/2009
Cs137	ND		4.5e-02	PCI/GDRY	03/26/2009
I131	ND		1.1e+00	PCI/GDRY	03/26/2009
K40	1.96e+01	2.3e+00		PCI/GDRY	03/26/2009
Pb212	8.15e-01	1.1e-01		PCI/GDRY	03/26/2009
Pb214 *	7.44e+00	8.6e-01		PCI/GDRY	03/26/2009
Ra223 *	2.08e-01	1.6e-01		PCI/GDRY	03/26/2009
Ra224	1.15e+00	6.1e-01		PCI/GDRY	03/26/2009
Ra226 *	1.06e+01	1.3e+00		PCI/GDRY	03/26/2009
Ra228	8.14e-01	1.2e-01		PCI/GDRY	03/26/2009
Tl208	2.69e-01	4.0e-02		PCI/GDRY	03/26/2009
U235 *	6.66e-01	8.4e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02921D	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.540e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	91.74 %	Analyst:	RCL
Ash/dry weight:	96.00 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/05/2009 16:24	1000.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		7.1e-01	PCI/GDRY	03/26/2009
Bi212	7.69e-01	2.0e-01		PCI/GDRY	03/26/2009
Bi214 *	7.78e-01	9.8e-02		PCI/GDRY	03/26/2009
Co60	ND		3.9e-02	PCI/GDRY	03/26/2009
Cs137	2.54e-01	3.5e-02		PCI/GDRY	03/26/2009
I131	ND		7.2e-01	PCI/GDRY	03/26/2009
K40	1.70e+01	2.0e+00		PCI/GDRY	03/26/2009
Pb210 *	2.00e+00	3.7e-01		PCI/GDRY	03/26/2009
Pb212	6.91e-01	8.6e-02		PCI/GDRY	03/26/2009
Pb214 *	8.28e-01	1.0e-01		PCI/GDRY	03/26/2009
Ra224	7.49e-01	3.5e-01		PCI/GDRY	03/26/2009
Ra226 *	1.49e+00	3.4e-01		PCI/GDRY	03/26/2009
Ra228	7.42e-01	1.0e-01		PCI/GDRY	03/26/2009
Th234 *	5.67e-01	1.5e-01		PCI/GDRY	03/26/2009
Tl208	2.24e-01	3.3e-02		PCI/GDRY	03/26/2009
U235 *	9.36e-02	2.1e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02922E	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.520e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	86.03 %	Analyst:	RCL
Ash/dry weight:	89.20 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 10:12	100.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		7.4e+00	PCI/GDRY	03/26/2009
Bi214 *	1.59e+01	1.9e+00		PCI/GDRY	03/26/2009
Co60	ND		2.3e-01	PCI/GDRY	03/26/2009
Cs137	2.36e-01	9.2e-02		PCI/GDRY	03/26/2009
I131	ND		9.8e+00	PCI/GDRY	03/26/2009
K40	1.71e+01	2.5e+00		PCI/GDRY	03/26/2009
Pb210 *	8.06e+00	1.8e+00		PCI/GDRY	03/26/2009
Pb212	7.17e-01	1.7e-01		PCI/GDRY	03/26/2009
Pb214 *	1.62e+01	1.9e+00		PCI/GDRY	03/26/2009
Ra226 *	2.01e+01	3.0e+00		PCI/GDRY	03/26/2009
Ra228	5.95e-01	2.9e-01		PCI/GDRY	03/26/2009
Tl208	1.05e-01	7.8e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	A9.02923F	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.630e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	86.97 %	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 15:19	300.0	GE14	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+00	PCI/GDRY	03/26/2009
Bi212	4.89e-01	2.4e-01		PCI/GDRY	03/26/2009
Bi214 *	5.74e+00	6.7e-01		PCI/GDRY	03/26/2009
Co60	ND		4.6e-02	PCI/GDRY	03/26/2009
Cs137	2.40e-01	3.6e-02		PCI/GDRY	03/26/2009
I131	ND		2.4e+00	PCI/GDRY	03/26/2009
K40	1.92e+01	2.3e+00		PCI/GDRY	03/26/2009
Pb212	5.62e-01	8.0e-02		PCI/GDRY	03/26/2009
Pb214 *	6.12e+00	7.1e-01		PCI/GDRY	03/26/2009
Ra223 *	1.23e-01	9.8e-02		PCI/GDRY	03/26/2009
Ra224	9.31e-01	5.5e-01		PCI/GDRY	03/26/2009
Ra226 *	8.92e+00	1.1e+00		PCI/GDRY	03/26/2009
Ra228	5.91e-01	9.3e-02		PCI/GDRY	03/26/2009
Tl208	1.29e-01	2.8e-02		PCI/GDRY	03/26/2009
U235 *	5.60e-01	7.2e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02924G	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.580e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	86.84 %	Analyst:	RCL
Ash/dry weight:	91.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/04/2009 16:25	1000.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		7.6e-01	PCI/GDRY	03/26/2009
Bi212	7.78e-01	2.4e-01		PCI/GDRY	03/26/2009
Bi214 *	1.72e+00	2.0e-01		PCI/GDRY	03/26/2009
Co60	ND		4.3e-02	PCI/GDRY	03/26/2009
Cs137	1.60e-01	2.5e-02		PCI/GDRY	03/26/2009
I131	ND		7.2e-01	PCI/GDRY	03/26/2009
K40	1.87e+01	2.2e+00		PCI/GDRY	03/26/2009
Pb210 *	2.00e+00	3.9e-01		PCI/GDRY	03/26/2009
Pb212	7.31e-01	9.1e-02		PCI/GDRY	03/26/2009
Pb214 *	1.79e+00	2.1e-01		PCI/GDRY	03/26/2009
Ra223 *	1.96e-01	7.3e-02		PCI/GDRY	03/26/2009
Ra224	8.76e-01	3.6e-01		PCI/GDRY	03/26/2009
Ra226 *	2.81e+00	4.7e-01		PCI/GDRY	03/26/2009
Ra228	7.51e-01	1.0e-01		PCI/GDRY	03/26/2009
Th234 *	3.60e-01	1.5e-01		PCI/GDRY	03/26/2009
Tl208	2.38e-01	3.5e-02		PCI/GDRY	03/26/2009
U235 *	1.77e-01	3.0e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02925H	QC batch #:	0005750W
Matrix:	SOIL	Assay batch #:	0013224J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.540e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	79.85 %	Analyst:	RCL
Ash/dry weight:	87.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 15:37	1000.0	GE08	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba140	ND		1.1e+00	PCI/GDRY	03/26/2009
Bi212	6.79e-01	1.9e-01		PCI/GDRY	03/26/2009
Bi214 *	8.20e-01	1.0e-01		PCI/GDRY	03/26/2009
Co60	ND		3.7e-02	PCI/GDRY	03/26/2009
Cs137	2.54e-01	3.5e-02		PCI/GDRY	03/26/2009
I131	ND		1.4e+00	PCI/GDRY	03/26/2009
K40	1.67e+01	2.0e+00		PCI/GDRY	03/26/2009
Pb210 *	2.00e+00	3.7e-01		PCI/GDRY	03/26/2009
Pb212	7.33e-01	9.0e-02		PCI/GDRY	03/26/2009
Pb214 *	8.24e-01	1.0e-01		PCI/GDRY	03/26/2009
Ra223 *	2.30e-01	6.3e-02		PCI/GDRY	03/26/2009
Ra224	5.92e-01	3.3e-01		PCI/GDRY	03/26/2009
Ra226 *	1.43e+00	3.2e-01		PCI/GDRY	03/26/2009
Ra228	7.53e-01	1.0e-01		PCI/GDRY	03/26/2009
Th234 *	4.10e-01	1.4e-01		PCI/GDRY	03/26/2009
Tl208	2.38e-01	3.4e-02		PCI/GDRY	03/26/2009
U235 *	9.03e-02	2.0e-02		PCI/GDRY	03/26/2009

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021  
SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00559857U	QC batch #:	0005750W
Matrix:	N/A	Assay batch #:	0013224J
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 15:37	1000.0	GE15	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Ba133	9.49e+01	1.2e+01		PCI	11/01/2006
Ba140	ND		1.9e+04	PCI	11/01/2006
Co60	7.71e+01	9.4e+00		PCI	11/01/2006
Cs137	1.29e+02	1.5e+01		PCI	11/01/2006
Eu152	1.04e+02	1.4e+01		PCI	11/01/2006
I131	ND		5.0e+03	PCI	11/01/2006
K40	ND		5.4e+01	PCI	11/01/2006
Pb210 *	2.66e+02	8.8e+01		PCI	11/01/2006
Pb212	7.32e+00	8.2e+00		PCI	11/01/2006
Ra226	ND		1.2e+02	PCI	11/01/2006
Ra228	ND		7.0e+01	PCI	11/01/2006

\* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021**

**SAMPLE ANALYSIS REPORT**

Sample #:	RBK-00559856T	QC batch #:	0005750W
Matrix:	N/A	Assay batch #:	0013224J
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 15:37	1000.0	GE16	RCL

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e+01	PCI	05/04/2009
Co60	ND		3.7e+00	PCI	05/04/2009
Cs137	ND		3.1e+00	PCI	05/04/2009
I131	ND		6.5e+00	PCI	05/04/2009
K40	1.88e+01	1.4e+01		PCI	05/04/2009
Ra226	ND		5.1e+01	PCI	05/04/2009
Ra228	ND		2.0e+01	PCI	05/04/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG 0900021**

**QC BATCH SUMMARY**

QC batch #: 0005750W

Preparation procedure: N/A

Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
A9.02906E		N/A		RCL
A9.02906E	DUP	N/A		RCL
A9.02907F		N/A		RCL
A9.02908G		N/A		RCL
A9.02909H		N/A		RCL
A9.02910A		N/A		RCL
A9.02911B		N/A		RCL
A9.02912C		N/A		RCL
A9.02913D		N/A		RCL
A9.02914E		N/A		RCL
A9.02915F		N/A		RCL
A9.02916G		N/A		RCL
A9.02917H		N/A		RCL
A9.02918J		N/A		RCL
A9.02919K		N/A		RCL
A9.02920C		N/A		RCL
A9.02921D		N/A		RCL
A9.02922E		N/A		RCL
A9.02923F		N/A		RCL
A9.02924G		N/A		RCL
A9.02925H		N/A		RCL
LCS-00559857U *	LCS	N/A		RCL
RBK-00559856T *	RBK	N/A		RCL

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**National Air and Radiation Environmental Laboratory  
QC Batch Report**

QC Batch #: 0005750W

Analytical Procedure: NAREL GAM-01

**METHOD BLANKS (PCI)**

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date
00559856T	BA140		
00559856T	CO60		
00559856T	CS137		
00559856T	I131		
00559856T	K40		
00559856T	RA226		
00559856T	RA228		
		1.88e+01 $\pm$ 1.4e+01	

**LABORATORY DUPLICATES (PCI/GDRY)**

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A9.02906E	BA140				
A9.02906E	BI212	1.40e+00 $\pm$ 2.4e-01	1.48e+00 $\pm$ 2.2e-01	5.56	0.49 OK
A9.02906E	CO60				
A9.02906E	CS137				
A9.02906E	I131				
A9.02906E	K40	2.07e+01 $\pm$ 2.4e+00	2.19e+01 $\pm$ 2.5e+00	5.63	0.68 OK
A9.02906E	PB212	1.49e+00 $\pm$ 1.8e-01	1.44e+00 $\pm$ 1.7e-01	3.41	-0.41 OK
A9.02906E	RA224	1.22e+00 $\pm$ 3.6e-01	9.00e-01 $\pm$ 3.0e-01	30.19	-1.36 OK
A9.02906E	RA228	1.45e+00 $\pm$ 1.8e-01	1.51e+00 $\pm$ 1.8e-01	4.05	0.48 OK
A9.02906E	TL208	4.98e-01 $\pm$ 6.1e-02	4.81e-01 $\pm$ 5.9e-02	3.47	-0.40 OK

**LAB CONTROL SAMPLES (PCI)**

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00559857U	BA133	1.04e+02 $\pm$ 2.1%	9.49e+01 $\pm$ 1.2e+01	91.54	-1.50 OK
00559857U	BA140	NO SPIKE DATA			
00559857U	CO60	7.36e+01 $\pm$ 2.1%	7.71e+01 $\pm$ 9.4e+00	104.81	0.74 OK
00559857U	CS137	1.16e+02 $\pm$ 2.1%	1.29e+02 $\pm$ 1.5e+01	111.55	1.70 OK
00559857U	EU152	9.54e+01 $\pm$ 2.1%	1.04e+02 $\pm$ 1.4e+01	108.96	1.20 OK
00559857U	I131	NO SPIKE DATA			
00559857U	K40	NO SPIKE DATA			
00559857U	PB212	NO SPIKE DATA			
00559857U	RA226	NO SPIKE DATA			
00559857U	RA228	NO SPIKE DATA			

Analyst:

Robert C. Lowry

5-14-09

QA Officer:

J. McLean

5/18/09